WHAT IS CLAIMED IS:

1. An optical encoder comprising:

light irradiating system;

an optical scale having a grating for transmitting or reflecting incident light;

light-receiving elements disposed in a plurality of different directions; and

an optical system constructed so as to amplitude-modulate light traveling from said light irradiating system to said optical scale and transmitted or reflected by the grating, by a dividing element in which a plurality of V-shaped grooves are juxtaposed, and so as to divide the amplitude-modulated light into beams along a plurality of different directions to guide the beams to the respective light-receiving elements;

wherein said dividing element is comprised of repetitions of such structure that a plurality of V-grooves consisting of planes of mutually different angles are juxtaposed at a predetermined pitch.

2. The optical encoder according to Claim 1, wherein said dividing element forms at least one set of beams having a phase relation of 180°.

3. The optical encoder according to Claim 2, wherein said dividing element comprises repetitions of

four types of different planes.

4. The optical encoder according to Claim 1, wherein said dividing element and said optical scale are comprised of a common member.

5. The optical encoder according to Claim 4, wherein a portion functioning as said dividing element of said common member is provided in an outside region or in an inside region of said grating.

6. An optical encoder comprising:

light irradiating system;

an optical scale comprising scale slits of a periodic structure;

a light-receiving element; and

an optical system constructed so as to make light traveling from said light irradiating system to the scale slits of a first region of said optical scale, incident to the scale slits of a second region of said optical scale by a mirror or another optical element to guide the light having passed via the scale slits of the second region to said light-receiving element;

wherein in said optical scale the number of the scale slits of said first region is different from the number of the scale slits of said second region.

7. The optical encoder according to Claim 6, wherein said optical scale is constructed so as to be rotatable relative to the other members, wherein said first region is disposed in an inside diameter side while said second region in an outside diameter side, and wherein the number of the scale slits of said first region is smaller than the number of the scale slits of said second region.

8. The optical encoder according to Claim 6, wherein said optical scale is constructed so as to be rotatable relative to the other members, wherein said first region is disposed in an outside diameter side while said second region in an inside diameter side, and wherein the number of the scale slits of said first region is larger than the number of the scale slits of said second region.

9. The optical encoder according to Claim 6, wherein said optical scale is constructed so as to be rotatable relative to the other members and wherein a ratio of the numbers of the scale slits of said first and second regions is approximately equal to a ratio of distances from a rotation center of relative rotation of said optical scale to radial centers of said respective regions.

10. An optical encoder comprising:

light irradiating system;

an optical scale comprising scale slits of a periodic structure;

a light-receiving element; and

an optical system constructed so as to make light traveling from said light irradiating system to the scale slits of a first region of said optical scale, incident to the scale slits of a second region of said optical scale by a mirror or another optical element to guide the light having passed via the scale slits of the second region to said light-receiving element;

wherein in said optical scale a surface provided with the scale slits of said first region is different from a surface provided with the scale slits of said second region.

11. The optical encoder according to Claim 10, wherein said optical scale is constructed so as to be rotatable relative to the other members, wherein said first region is disposed in an inside diameter side while said second region in an outside diameter side, and wherein the surface provided with the scale slits of said first region is disposed so as to be closer to said optical element.

12. The optical encoder according to Claim 10, said optical encoder being used for detection of an angle or a speed of relative rotation of said optical scale.

13. An optical encoder comprising:

light irradiating system;

an optical scale comprising scale slits of a periodic structure;

a light-receiving element; and

an optical system constructed so as to make light traveling from said light irradiating system to the scale slits of a first region of said optical scale, incident to the scale slits of a second region of said optical scale by a mirror or another optical element to guide the light having passed via the scale slits of the second region to said light-receiving element;

wherein in said optical scale the scale slits of said first and second regions are comprised of grooves of V-shaped cross section and wherein slope angles are different from each other between the grooves of the V-shaped cross section of the scale slits in said first and second regions.

14. The optical encoder according to Claim 13, wherein the slope angles of the V-shaped grooves of the

scale slits in said first region are smaller than those in said second region.

15. The optical encoder according to Claim 13, said optical encoder being used for detection of an angle or a speed of relative rotation of said optical scale.

16. An optical encoder comprising:

light irradiating system;

an optical scale comprising scale slits of a periodic structure;

a light-receiving element; and

an optical system constructed so as to make light traveling from said light irradiating system to the scale slits of a first region of said optical scale, incident to the scale slits of a second region of said optical scale by a mirror or another optical element to guide the light having passed via the scale slits of the second region to said light-receiving element;

wherein in said optical scale the scale slits of said first and second regions are comprised of grooves of V-shaped cross section and wherein the V-shape of the grooves of the scale slits in said second region comprises slopes of N types of angles in a number of P/N in one period where P is a pitch of the

periodic structure of the scale slits and N a natural number.

17. The optical encoder according to Claim 16, said optical encoder being used for detection of an angle or a speed of relative rotation of said optical scale.

18. An optical encoder comprising:

light irradiating system;

an optical scale comprising scale slits of a periodic structure;

a light-receiving element; and

an optical system constructed so that light traveling from said light irradiating system to the scale slits of a first region of said optical scale and reflected by the first region is reflected and condensed via only one condensing mirror onto the scale slits of a second region of said optical scale and so that the light having passed via the scale slits of the second region is guided to said light-receiving element.

19. The optical encoder according to Claim 18, wherein said second region performs wavefront division by a difference between reflecting directions.

20. The optical encoder according to Claim 19, wherein said first region has a periodic structure of reflecting portions and transmitting portions.

21. The optical encoder according to Claim 19, wherein said first region has a periodic structure of flat portions and groove portions of V-shaped cross section.

22. The optical encoder according to Claim 21, wherein said second region emits beams in four different directions from different portions, respectively.

23. The optical encoder according to Claim 18, wherein said first region has a periodic structure for giving reflected light a periodic path difference of a half wavelength.

24. The optical encoder according to Claim 18, wherein said first region has a periodic structure of flat portions and groove portions of V-shaped cross section and periodic structure in which there appears a difference of a half wavelength in every other width of the flat portions.

25. The optical encoder according to Claim 18,

wherein said first region has a periodic structure of groove portions of V-shaped cross section and periodic structure in which there appears a difference of a quarter wavelength in every other depth of grooves in the groove portions of the V-shaped cross section.

26. The optical encoder according to Claim 18, said optical encoder being used for detection of information on relative rotation of said optical scale.

27. The optical encoder according to Claim 18, said optical encoder being used for detection of information on relative translational displacement of said optical scale.

28. The optical encoder according to Claim 18, wherein reflected light from said second region is received by said light-receiving element.

29. The optical encoder according to Claim 18, wherein said condensing mirror is disposed on an optical element in said light irradiating system.

30. A driving system comprising:

a driver system;

a control system for controlling driving of said driver system; and

an optical encoder for detecting information on the driving of said driver system to output a signal to said control system, said optical encoder comprising:

(1) light irradiating system;

(2) an optical scale having a grating for transmitting or reflecting incident light;

(3) separate light-receiving elements disposed in a plurality of different directions; and

(4) an optical system constructed so as to amplitude-modulate light traveling from said light irradiating system to said optical scale and transmitted or reflected by the grating, by a dividing element in which a plurality of V-shaped grooves are juxtaposed, and so as to divide the amplitude-modulated light into beams along a plurality of different directions to guide the beams to the respective separate light-receiving elements;

wherein said dividing element is comprised of repetitions of such structure that a plurality of V-grooves consisting of planes of mutually different angles are juxtaposed at a predetermined pitch.

31. A driving system comprising:

a driver system;

a control system for controlling driving of said driver system; and

an optical encoder for detecting information on

the driving of said driver system to output a signal to said control system, said optical encoder comprising:

(1) light irradiating system;

(2) an optical scale comprising scale slits of a periodic structure;

(3) a light-receiving element; and

(4) an optical system constructed so as to make light traveling from said light irradiating system to the scale slits of a first region of said optical scale, incident to the scale slits of a second region of said optical scale by a mirror or another optical element to guide the light having passed via the scale slits of the second region to said light-receiving element;

wherein in said optical scale the number of the scale slits of said first region is different from the number of the scale slits of said second region.

32. A driving system comprising:

a driver system;

a control system for controlling driving of said driver system; and

an optical encoder for detecting information on the driving of said driver system to output a signal to said control system, said optical encoder comprising:

(1) light irradiating system;

(2) an optical scale comprising scale slits of

a periodic structure;

(3) a light-receiving element; and

(4) an optical system constructed so as to make light traveling from said light irradiating system to the scale slits of a first region of said optical scale, incident to the scale slits of a second region of said optical scale by a mirror or another optical element to guide the light having passed via the scale slits of the second region to said light-receiving element;

wherein in said optical scale a surface provided with the scale slits of said first region is different from a surface provided with the scale slits of said second region.

33. A driving system comprising:

a driver system;

a control system for controlling driving of said driver system; and

an optical encoder for detecting information on the driving of said driver system to output a signal to said control system, said optical encoder comprising:

(1) light irradiating system;

(2) an optical scale comprising scale slits of a periodic structure;

(3) a light-receiving element; and

(4) an optical system constructed so as to make

light traveling from said light irradiating system to the scale slits of a first region of said optical scale, incident to the scale slits of a second region of said optical scale by a mirror or another optical element to guide the light having passed via the scale slits of the second region to said light-receiving element;

wherein in said optical scale the scale slits of said first and second regions are comprised of grooves of V-shaped cross section and wherein slope angles are different from each other between the grooves of the V-shaped cross section of the scale slits in said first and second regions.

34. A driving system comprising:

a driver system;

a control system for controlling driving of said driver system; and

an optical encoder for detecting information on the driving of said driver system to output a signal to said control system, said optical encoder comprising:

(1) light irradiating system;

(2) an optical scale comprising scale slits of a periodic structure;

(3) a light-receiving element; and

(4) an optical system constructed so as to make light traveling from said light irradiating system to

the scale slits of a first region of said optical scale, incident to the scale slits of a second region of said optical scale by a mirror or another optical element to guide the light having passed via the scale slits of the second region to said light-receiving element;

wherein in said optical scale the scale slits of said first and second regions are comprised of grooves of V-shaped cross section and wherein the V-shape of the grooves of the scale slits in said second region comprises slopes of N types of angles in a number of P/N in one period where P is a pitch of the periodic structure of the scale slits and N a natural number.

35. A driving system comprising:

a driver system;

a control system for controlling driving of said driver system; and

an optical encoder for detecting information on the driving of said driver system to output a signal to said control system, said optical encoder comprising:

(1) light irradiating system;

(2) an optical scale comprising scale slits of a periodic structure;

(3) a light-receiving element; and

(4) an optical system constructed so that light

traveling from said light irradiating system to the scale slits of a first region of said optical scale and reflected by the first region is reflected and condensed via only one condensing mirror onto the scale slits of a second region of said optical scale and so that the light having passed via the scale slits of the second region is guided to said light-receiving element.